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Olene S. Walker
Governor

CENTERS OF EXCELLENCE

ANNUAL REPORT

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Fiscal Year July 2003—June 2004

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2003-2004
Centers of Excellence
Annual Report

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Executive Summary

Executive Summary
CENTERS OF EXCELLENCE
2003 ANNUAL REPORT

MISSION STATEMENT

The purpose of the Office of Technology Development's Utah Centers of Excellence Program is to promote the creation, development, and expansion of technology based businesses and industry. To accomplish this, the goals include:

· Maximizing the economic impact of research and development performed at Utah's universities.

· Facilitating the licensing of mature technologies to Utah businesses.

· Encouraging the establishment and growth of Utah businesses based on new and developing technologies.

· Promoting the availability and use of technical and capital resources for Utah's technology based businesses.

HIGHLIGHTS

Through fiscal year 2001, the Office of Technology Development's Utah Centers of Excellence Program leveraged a cumulative state investment of $35.6 million with non-state matching funds totaling $377 million. To date, the program was responsible for the creation of:

- 150 new high technology companies
- 176 new patents either issued or pending
- 204 licenses signed between businesses and Utah universities
- 10.6:1 cumulative match ratio

The Utah Centers of Excellence Program, widely regarded as one of the nation's most productive and successful programs of its type, sponsors the development and commercialization of technologies currently being researched at Utah's universities. By helping to introduce these commercially important new products, the Centers program plays a vital role in the growth of Utah's high technology economy.

During the fiscal year, the Centers program continued to manage a legislative appropriation of $2 million. New appointees to the Centers advisory council have strengthened the technical expertise of the council. Expanded consulting services provided to Center directors have greatly improved the commercialization opportunities for funded Centers. Planning grants have been reduced from $10,000 to $5,000 to fund more potential Centers with greater focus on market analysis.

2003-2004
Funded Centers

Acoustic Cooling

U N I V E R S I T Y O F U T A H

CENTER

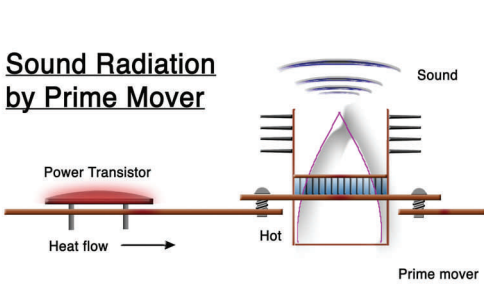
The Center for Acoustic Cooling Technologies was originally established to commercialize novel high frequency thermoacoustic engines for cooling applications. One important application for this technology is in the heat management of computers and other devices employing dense arrays of microcircuits. Subsequent work has resulted in the demonstration of a prototype device capable of converting heat into electricity at high efficiency.

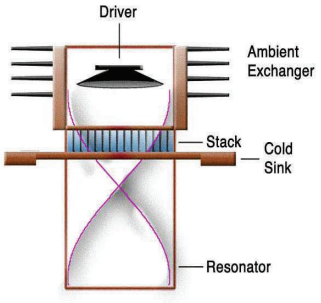
TECHNOLOGY

The Center for Acoustic Cooling is leveraging fundamental developments in miniature thermo-acoustic devices supported by the Office of Naval Research and DARPA. The Center's technology is based on two effects in thermo acoustics: The first is that heat can be converted into sound energy, and the second is that sound can pump heat. Both have been employed in devices with dimensions ranging from 4 cm to 0.8 cm. Piezoelectric materials have now been incorporated in order to recover electricity in some cases.

ACCOMPLISHMENTS

Prototype devices have been constructed and successfully demonstrated by an independent company. The last year has seen more successful miniaturization and improved heat transfer, which is the limiting factor for cooling power. Prototype heat to sound to electricity converters have been built and tested with efficiency ranging from 10-25% at a temperature difference of 50 C.

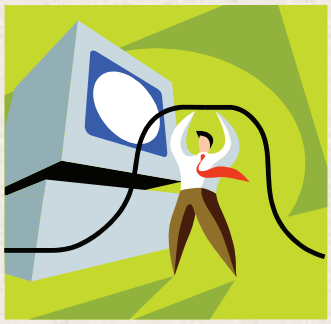




THINK TANK

What if there was...

A miniature cooling device with no moving parts and using sound as its main energy source, that could replace the fans in desktop computers and other devices and appliances?



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Advanced Imaging LADAR

UTAH STATE UNIVERSITY

CENTER

The Center for Advanced Imaging LADAR was formed to commercialize a now patented camera technique that uniquely combines laser distance measurement with digital color imaging, resulting in detailed, 3-D color images that can be captured in real time and also stored for later analysis and manipulation in virtual reality environments. Civilian and military markets exist for stationary, airborne and spaceborne versions of the technology.

TECHNOLOGY

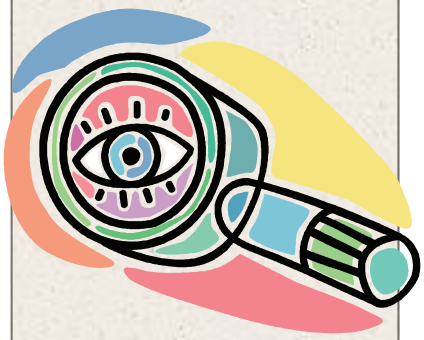
CAIL's technology couples existing 3D LADAR (Laser Detection and Ranging) technology with 2D digital color imaging in the unique 3D Texel Camera. Previously, distance and spectral datasets had to be collected separately, carefully registered, and then superimposed – laborious reprocessing that often required days to weeks. The CAIL technology works in real time – the first system to enable precise 3D color imaging when either the scene, the camera or both are moving.

ACCOMPLISHMENTS

Their key patent issued in December 2003, and a Utah company (RappidMapper, Inc.) is pursuing the manufacturing and marketing of land-based systems while the development of airborne platforms continues.

THINK TANK

What if there was...



A way to take high-resolution 3-D color photos incorporating GPS location data in real time instead of days??

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Advanced Joining of Materials

BRIGHAM YOUNG UNIVERSITY

CENTER

The Center for Advanced Joining of Materials **(CAJM**) is developing enhancements and new technologies based on friction stir welding (FSW). FSW is a relatively new, innovative joining technology that is revolutionizing the way in which aluminum, copper and other materials are being joined. The objectives are to develop enhancements to this existing technology that will broaden the use of this process in new materials and applications, and to transfer these technologies to local, national and international companies.

TECHNOLOGY

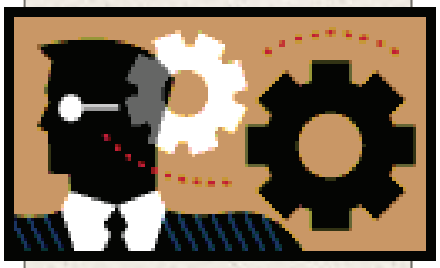
The Center has been focused on the development and marketing of three technological aspects of FSW: 1) tooling that will last longer, offer the ability to join a wider range of advanced materials, and enable better control of the resulting quality of the weld and its properties; 2) new control systems and hardware for large scale, three-dimensional FSW capabilities; and 3) new methods and novel tooling for joining polymeric materials.

ACCOMPLISHMENTS

In this last year of funding, FSW rode a rising tide of interest to claim $2.1 million in federal and industrial matching dollars, for a return of 23:1 on state dollars invested. During its tenure as a Center of Excellence, FSW has generated 11 pending and 2 issued patents. BYU issued an exclusive license for the patent on super abrasive tools to MegaStir, a spinout Utah company that already employs nearly 20 people, and granted additional licenses to the existing firm Advanced Metal Products. Interest from the pipeline, auto and shipbuilding markets is strong and growing, with major multinational customers already established. The Center continues development of the technology for additional materials on its own with federal and industrial funding.

THINK TANK

What if there was...



A new method for welding different metals that didn't melt the material, didn't add new material, and formed a joint that was base metal strong and nearly indistinguishable from the adjacent material?

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Advanced Structural Composites

BRIGHAM YOUNG UNIVERSITY

IsoTruss STRUCTURES, INC.

CENTER

The objective of the Center for Advanced Structural Composites is to commercialize the IsoTruss technology. The IsoTruss enables the creation of super lightweight grid structures with the potential for revolutionizing industries as diverse as civil infrastructure (e.g., communication and construction), aerospace, automotive, marine and sporting structures and virtually any application area requiring high strength, high stiffness, light weight and superb corrosion resistance.

TECHNOLOGY

The core technology consists of an ultra-lightweight composite structural shape known as the IsoTruss. The IsoTruss is a novel, patented, three-dimensional structural form that takes advantage of the highly directional properties of high strength composites to produce an extremely efficient and lightweight structure. The IsoTruss incorporates stable geometric configurations with helical members that spiral in opposing directions around a central cavity, coupled with longitudinal members that pass through the intersections.

ACCOMPLISHMENTS

A new Utah firm, known as IsoTruss Structures Inc., licensed the rights for domestic commercial applications and has begun to sell products, aiming to first displace wooden utility poles. Conventional poles weigh half a ton and last 5-40 years, while IsoTruss poles weigh 300 pounds and are expected to last 60-100 years for the same price, while costing less to transport and install.

THINK TANK

What if there was...

A corrosion free power line tower that weighed far less than existing steel towers but could resist high winds, bear heavy loads, and remain unaffected by extreme temperatures?

Center for Advanced CASC Structural Composites

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Agricultural Byproducts, Profitable Use of

U T A H S T A T E U N I V E R S I T Y

CENTER

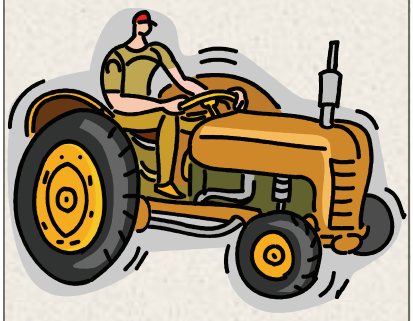
The Center for Profitable Use of Agricultural Byproducts was established to commercialize technologies utilizing agricultural production and processing byproducts. Waste materials of little or no value are transformed into energy and other salable items using technology developed at the center.

TECHNOLOGY

The USU technology has two basic components: 1) an induced sludge bed anaerobic reactor that can produce energy (biogas) and soil amendment from manure and food processing waste, and 2) a high rate aerobic (drum composter based) bioreactor that make the system more cost effective, and the products produced by the process more valuable. The scalable, modular system is reliable and easily managed.

ACCOMPLISHMENTS

There are now three plants in Utah which are fully operational and producing electricity. One of these plants generates enough electricity to power its own farm and then put enough electricity back into the grid to earn a monthly check of $1,000 or more from Pacificorp! There is now one issued and one pending patent on the technology, and a new Utah company, Andigen, has been formed to build the anaerobic systems on farms. Increased funding has been flowing from the USDA and DOE, and commercial interest is growing throughout the Western U.S.



THINK TANK

What if there was...

A technology that took agricultural waste of little or no value and turned it into electricity and salable products???

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Computational Design and Testing

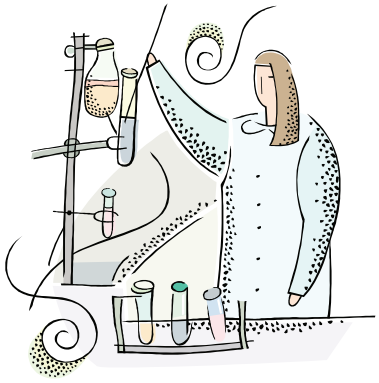
U N I V E R S I T Y O F U T A H

CENTER

The objective of this new Center is to commercialize computational engines that facilitate and accelerate the design and testing of novel materials and device elements, with a special focus on nanostructured materials and devices.

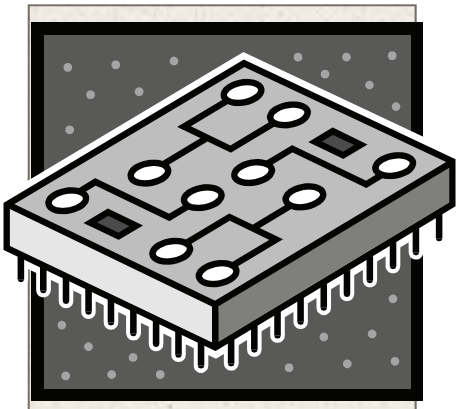
TECHNOLOGY

The center is focused on two computational engines: Materials Designer (MaDes) and Device Simulator (DeSim). The algorithms of MaDes predict the structural and mechanical properties of new materials based on first-principles analysis at the level of atomic forces, while DeSim models the electrical properties and performance of components constructed with novel materials.



ACCOMPLISHMENTS

Several goals have been accomplished in the first two years of funding for this Center. A patent is now pending on the design for a carbon nanotube electromechanical pressure sensor developed with these tools, a web based user interface for on-line computational applications has been successfully demonstrated, and industry-funded work in the electronic component area is moving forward.



THINK TANK

What if there was...

A way to virtually eliminate the need for costly and time-consuming trial-and-error in the development of materials like semiconductors?

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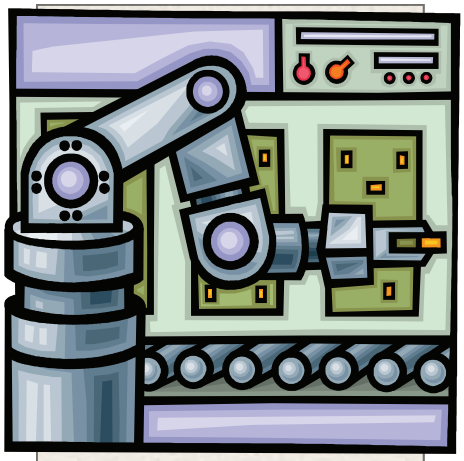
Direct Machining and Control

BRIGHAM YOUNG UNIVERSITY

CENTER

This Center is commercializing a disruptive technology for manufacturing: A new paradigm of one controller for many devices. That is, multiple machine tools can be run by one operator, through a network, rather than by individual operators. Instead of every machine having its own control panel, one program and one controller could theoretically manage all the machines within a plant—creating dramatic cost savings. A related application of the core technology (VMAC) is being developed for the home automation market.



TECHNOLOGY

The DMAC technology is based on the development of an open architecture controller and supporting control algorithms for general control of advanced mechanisms such as 5-axis machine tools. This controller uses a dual CPU PC/controller so that the CAD/CAM application can run under Windows, while the real-time control software can run under a second CPU. The motors and machine Input/Output (I/O) are commanded over a high speed network such as fiber optic and IEEE 1394 (firewire). The control software consists of object oriented libraries that integrate motion planning, trajectory generation, servo-control, communication, and user interfaces.

ACCOMPLISHMENTS

Technical progress has continued across numerous fronts, such as the development of a VMAC control architecture for variable frequency control of different devices; the Center now has four patents pending as well as multiple contracts from major industrial partners. Direct Controls, Inc., a spin-off company in Orem, Utah, has just released its first product, and industry visits to the Center are averaging one per week.

THINK TANK

What if there was...

A way to control, in real time, a high speed network of motors, sensors and other components with a software-based digital control system???

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Electronic Medical Education

U N I V E R S I T Y O F U T A H

CENTER

The goal of this Center has been to commercialize visual annotation and knowledge representation software technology for use by physicians and scientists in image intensive fields. Key target markets have been: 1) Telemedicine and remote consultation, 2) Electronic medical records (EMR), specifically collection of expert knowledge and annotation of visual data as part of the clinical workflow, and 3) Biomedical/biotechnology imaging informatics annotation and knowledge representation.

TECHNOLOGY

CEME technology provides clinicians and basic scientists with knowledge representation tools built on the need to visually annotate (identify and label) images and add expert clinical knowledge (e.g., diagnosis, pathology report, or clinical note) to image data in the healthcare enterprise. The technology enables consultation and sharing of results at each stage of the clinical management of a patient, research or clinical study, and provides a mechanism to track multiple images and textual results in real time. CEME technology can either be integrated into existing imaging systems as a layer that facilitates communication, or exist as a standalone application in a research or healthcare enterprise.

ACCOMPLISHMENTS

CEME has leveraged its impressive 7 issued patents through the formation of two spinout companies that together already boast a seven-figure payroll: AMIRSYS, Inc., a producer of electronic medical reference material, and Global Matics, Inc., a service-based company managing information using images. The Center now has an MOU and Teaming Agreement to get CEME technology into Battlefield Telemedicine.

THINK TANK

What if there was...

A way to visually annotate images, share and discuss them in real time with colleagues throughout the world???

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Global Knowledge Management

U N I V E R S I T Y O F U T A H

CENTER

This new Center was formed to effect the commercialization of software tools representing the next generation of data mining technology, with the potential to leapfrog competing approaches by enabling customers to both quickly and inexpensively discover useful knowledge from databases and efficiently manage that knowledge over time as the underlying data or conditions of use change.

TECHNOLOGY

The rules, algorithms and programs developed by the Center address deficiencies in existing products by facilitating 'Knowledge Fusion' (integrating data mining techniques to discover more accurate or previously unattainable knowledge) and 'Dynamic Knowledge Refreshing' (automatically monitoring and updating changes in data related to previously discovered knowledge).

ACCOMPLISHMENTS

The Center has initially focused on implementing alpha versions of their Portal Wizards products for online businesses, and expect to be able to provide services using a version of this module for their analysts and end users by late 2004.

THINK TANK

What if there was...

A way for firms to constantly maximize the value of the information buried in their website records?

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High-Speed Information Processing

UTAH STATE UNIVERSITY

CENTER

This center is driving the creation of smaller, cheaper and faster chips to run miniature digital devices, by commercializing fast algorithm technologies for specific families of high-speed integrated circuit (IC) chips. When implemented in IC chips, fast algorithms add great value to chip designers, manufacturers, and OEMs because their products are cheaper, faster, smaller, and less power hungry than those with standard algorithms that use multipliers and large amounts of memory. Additional benefits flow from faster design cycles, compact implementation and low-cost hardware.

TECHNOLOGY

The center holds rights to several technologies such as: multiplier-free digital filters: design methodology and architecture; multiplier-free algorithms for hyperspectral image restoration and compression; full-duplex echo canceller: algorithm and architecture; feedback cancellation algorithms for hearing aids.; Fast Integer Fourier Transform (FIFT).

ACCOMPLISHMENTS

Patents are pending on the full-duplex echo canceller and on the multiplier-free digital filter design. The Center developed a full-duplex echo canceller that enables natural, lifelike conversations with speaker phones and never cuts off or enters half-duplex mode. They implemented the new echo canceller on a digital signal processing (DSP) chip that can be put into speaker phones for the home or office, and licensed the technology to a new Utah company, SP Communications, that plans to enter both the cell phone and speaker phone markets. A larger existing (confidential) Utah firm is funding work and incorporating related technology into their products as well.

THINK TANK

What if there was...

A way to have face-to-face like conversations with a speaker phone without those annoying echoes and cut offs???

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Homogeneous DNA Analysis

U N I V E R S I T Y O F U T A H

CENTER

This new center was formed to commercialize a novel suite of fast, user-friendly and inexpensive DNA sequence analysis tools that could be fielded in a doctor's office rather than requiring the services of an expensive reference laboratory, and which will reach markets including cancer testing, the diagnosis of inherited diseases, and rapid bioterrorism detection.

TECHNOLOGY

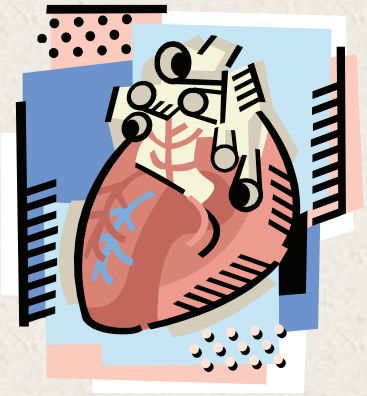
The central innovation involves a new, high-resolution twist on a very old technique for DNA sequence analysis: thermal denaturation profiles. A fluorescent dye, added before amplification via polymerase chain reaction (PCR), allows the melting transition of the PCR product to be continuously monitored without ever moving it from the same tube. Data processing allows even minute sequence changes to be readily identified through their effect on the melting profile.

ACCOMPLISHMENTS

The Center's first product has already been licensed to a Utah firm, Idaho Technologies, Inc., which has commenced commercial sales. Additional applications, instruments and software are currently in development, and collaboration with another Center of Excellence in the College of Engineering has begun.

THINK TANK

What if there was a way to...



Perform DNA-based diagnostic tests right in your doctor's office, instead of waiting weeks for your results?

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In Situ Sediment Ozonator

U N I V E R S I T Y O F U T A H

CENTER

This Center was newly created to commercialize the promising in situ ozonator (ISO) process, which when used together with other chemical-biological treatment technologies could remediate sediments contaminated with PCB, DDT and other recalcitrant organic contaminants. Such contaminated sediments are a serious problem in many industrialized countries, and there are currently no economically and technically feasible methods for treating them in place (in situ).

TECHNOLOGY

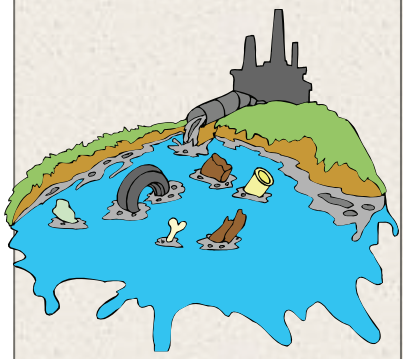
The powerful oxidizing power of ozone is harnessed in a safe, effective mechanism wherein sediments are processed and redeposited in a minimally invasive manner – immediately arresting contaminant release into the water, capping deeper contaminated layers, and promoting the onset of natural biodegradation.

ACCOMPLISHMENTS

This new Center has already completed laboratory treatment tests on PCBs and DDT, and commenced construction of a small prototype device. They have applied for an international patent, and attracted the interest and funding of both government and industry partners.

THINK TANK

What if there was...



A faster and cheaper way to remove DDT, PCBs and other tough contaminants from sediments to protect the environment and meet EPA standards?

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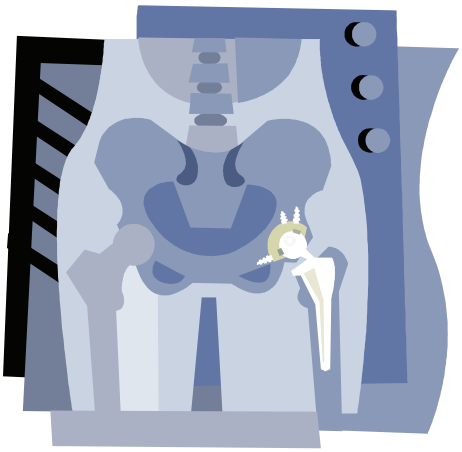
Novel TiB Surface Hardening

U N I V E R S I T Y O F U T A H

CENTER

This new Center is commercializing a novel method for hardening the surface of components fabricated from Titanium. Originally developed with government funding for use in creating lightweight Titanium armor, their approach for the first time makes this strong metal suitable for use in applications such as hip replacements, bearings and cutting tools where superior hardness coupled with wear resistance create a superior product.



TECHNOLOGY

The Center technology involves the incorporation of titanium monoboride (TiB) crystals into the surface of titanium components, creating a stable, spall-resistant surface layer conferring the advantages of hardness and wear resistance coupled with electrical and thermal conductivity.

ACCOMPLISHMENTS

The Center has applied for international patents, and a license has already been signed with Ortho Development Corporation, a Utah company, for the development and FDA validation of orthopedic implants using the TiB coating – offering for the first time the potential for implants that last a lifetime, even with young recipients.

THINK TANK

What if there was...

A method for adding a tightly bonded coating onto lightweight titanium parts to create superior hardness and wear resistance?

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Petroleum Research

U N I V E R S I T Y O F U T A H

CENTER

The Petroleum Research Center (PERC), which is an integral part of the Department of Chemical and Fuels Engineering at the University of Utah, is developing practical, cost-effective solutions to liquid hydrocarbon production, handling and transportation. PERC specifically works to understand problems related to the production, transportation and processing of waxy and asphaltenic crude oils, and alleviate those problems by developing a variety of methods and software tools (models) for the efficient and optimal production of oil and gas from underground reservoirs.

TECHNOLOGY

The Center is commercializing products in three areas: Flow Assurance (tools to help keep oil products moving through pipelines despite changing conditions or constituents), Oil Simulants (environmentally safe yet accurate substitutes for crude oil), and Reservoir Simulators (finite-element models for optimizing production from geometrically complex oil and gas fields). With funding from the U.S. DOE and the petroleum industry, the PERC coordinates basic and applied research in the physical properties and physical and chemical thermodynamics of naturally occurring hydrocarbons.

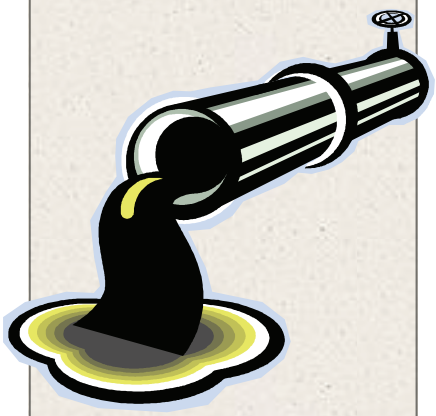
ACCOMPLISHMENTS

The Center has partnered with a manufacturer to field a new oil property prediction system using near-infrared spectroscopy and chemometrics. They have more than a 20:1 cumulative matching funds ratio, one issued patent and an additional patent pending. Work in partnership with major oil companies is continuing and expected to result in commercial deployment in the near future.

THINK TANK

What if there were...

A variety of methods and software tools to optimize the safe production of oil and gas from underground reservoirs?



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Rapid Prototyping

U N I V E R S I T Y O F U T A H

CENTER

The Center for Rapid Prototyping is focused on commercializing technologies related to ultrasonic sensing for injection molding processes, and physical and virtual geometric modeling for computer aided design.

TECHNOLOGY

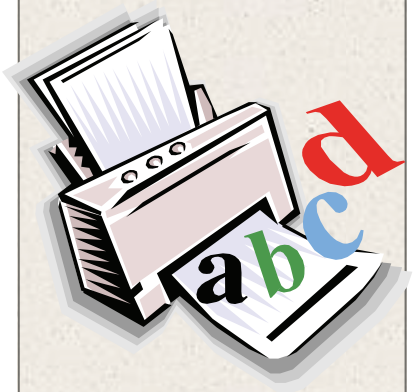
The Center has been working on multiple projects, including: Machining techniques that allow the prototyping of geometric objects of arbitrary complexity on a 3 axis CNC mill with limited tools and little operator skill required; a series of new sensors and controls for improved polymer processing; a Personal Prototyping System (PPS) that makes rapid prototyping affordable for small companies and perhaps even the average consumer; low cost 3-D scanning technologies that make the acquisition of 3-D geometric data practical and affordable for reverse engineering, medical imaging/reconstruction, etc.; a device that is capable of producing very large prototypes (Shapemaker); and a photopolymer-based technique to create prototypes in a single step (Inverse Tomographic Construction). New micro and nano-scale polymer manufacturing techniques have been developed, including a micro-forging technique and a nanoscale injection molding machine.

ACCOMPLISHMENTS

Milestones met include the production of the first micro-scale injection molded parts, the completion and testing of a production-type prototype high temperature ultrasound transducer and control system, and the production and test marketing of individualized replicas of human faces captured in a polymer-based collectible. With a cumulative 15:1 ratio of matching funds and one spin-off company already formed, the Center continues to progress toward graduation.

THINK TANK

What if there was...



A product that develops and creates simple prototypes at a very low cost on your own desktop printer???

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Representation of Multi-Dimensional Information (CROMDI)

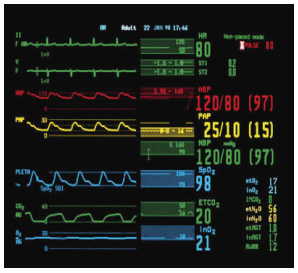
U N I V E R S I T Y O F U T A H

CENTER

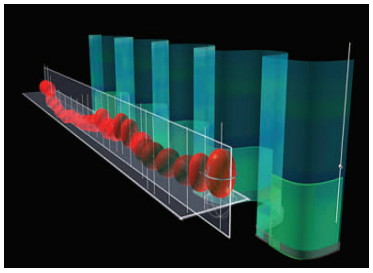
The Center for the Representation of Multi-Dimensional Information (CROMDI) was established to commercialize a newly patented audio-visualization technology (IntuInfo) that facilitates the rapid and accurate analysis of large quantities of quickly changing data.

TECHNOLOGY

The state of the art in many fields is to represent information with tables of numbers, waveforms, pie charts, diagrams and the like. IntuInfo embodies the ancient proverb that "A picture is worth ten thousand words." By visually displaying multiple variables using various objects and colors, a wide range of information is clearly presented. The association between the graphical objects and the data is designed to facilitate rapid understanding of large quantities of data. IntuInfo enables recognition of events that is significantly faster, more accurate, less mentally demanding and with less training than is possible using existing technologies.



Before Vs After



ACCOMPLISHMENTS

With two issued and three pending patents, a thriving spinout company (Applied Medical Visualization, Inc.), licenses with several existing firms and some $4.5 million in other contracts and grants, the Center continues to move into new markets including finance, time management and the military.

THINK TANK

What if there was...

A faster, more effective way to understand, evaluate and act on large amounts of complex data ?

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Smart Sensors

U N I V E R S I T Y O F U T A H

CENTER

In a general sense, Smart Sensors meld sensor, signal processing, and computer technologies to create new functionalities such as the ability to probe the environment and modify their function in order to improve their data gathering capability. Applications envisioned by this Center span medicine, precision agriculture, electronics manufacturing, wireless communication, transportation and radar.

TECHNOLOGY

The Center for Smart Sensors focuses on two core technologies that have the greatest commercial potential: The first core technology is circuitry for measuring length, distance or impedance; this enables a Smart Wire inspection system that can detect and locate faults or insulation breaks in aircraft wiring in real time. The second is the Imbedded Microstrip Antenna (IMA), which can sense or communicate in a buried environment. Both families of technologies are based on simple ideas and simple circuits that result in two critical characteristics -- they are **Small and Cheap**. This makes them applicable to a wide array of applications.

ACCOMPLISHMENTS

A single IMA antenna has now been demonstrated that can both sense and communicate. With a dozen pending and one issued patent, nearly seven figures worth of industry funding and two Utah spinout companies (LiveWire Test Labs, Inc. and RF Sensor Innovations), this Center is poised to make a significant contribution to Utah's presence in a number of markets. The commercialization of airline wiring fault detection is being accelerated with over $1 million in funding from the FAA and commercial aircraft firms.

THINK TANK

What if there was...

Early warning for disk drive failure, real-time detection of shorts in aircraft wiring, and a system to keep soldiers from being run over by tanks?

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Program Description

PROGRAM DESCRIPTION

BACKGROUND

Recognizing that both the growth of new industry and the expansion of existing industry in the next century would require both a strong technology base and a steady supply of new ideas, concepts, innovations, and prototypes, the Utah State Legislature created the Centers of Excellence Program (COEP) in 1986. The Legislature recommended the allocation of economic development funds annually to the COEP, to be awarded to college and university faculty on a competitive basis. The objectives of the COEP are to enhance and expand the applied technical research activities at institutions of higher education in Utah, to develop technologies that are considered to have potential for economic development in the state, and to assist in the actual commercialization of those technologies. This research and technology commercialization process ultimately results in the creation of new companies, the enhancement of business opportunities for existing companies that license COEP technologies, and in the growth of Utah's job opportunities. In addition, the proprietary value of technologies created is reflected in the number of patents issued and the associated royalty-bearing licenses that are signed.

Ongoing funding of the program has been based upon the real and potential economic impact that the Centers of Excellence Program has had upon the State of Utah during the years since its creation. This Annual Report summarizes the significant accomplishments of the program during the recently completed fiscal year.

OPERATIONS AND OBJECTIVES

The operating methods of the Centers Program have evolved over the years since its inception, with a continuing goal of achieving the maximum economic benefit from the individual Centers that have been created. Upon selection on a competitive basis, new Centers are funded with a minimum requirement of a 2:1 matching fund ratio from the private and federal sectors. Matching funds are reported and audited on a regular basis. Centers are also audited regularly for the achievement of technical and commercial milestones. Center directors are required to submit annual reports to the COEP director. The Centers of Excellence Program Annual Re-

port, attached here , is based on submitted reports and upon information gathered from site visits, audits and other data sources. In addition, each funded Center is assisted by one or more designated commercialization consultants, who assist Center directors in defining commercialization strategies, performing market and competitive analysis, and locating potential investors or licensees.

Centers are normally funded for a maximum of five years, and are then expected to be self-sustaining through license contract royalties and new research grants. Centers with especially noteworthy histories and ongoing technological impact are designated as Distinguished Centers, and thereafter may be funded on a project-by-project basis as requests are approved.

CENTER SELECTION PROCESS

Proposals from researchers for new Centers of Excellence or for renewal of existing Centers of Excellence are submitted to the COEP office in response to a Request for Proposal which is normally published in late December. The incoming proposals are critically reviewed by the Centers of Excellence Advisory Council. Centers are selected for funding based on a ranking established in extended review sessions with the Centers Advisory Council.

The State Advisory Council for Science and Technology (SAC) has advisory responsibility for the Centers of Excellence Program by statute. SAC members participate on the Centers Advisory Council, reviewing proposals and conducting site visits. This provides Science Council members with in-depth knowledge of the program, Center specific information and a strong technical and industrial perspective for making funding decisions. The State Science Advisor reviews the Annual Report and presents it to the Science Council for acceptance.

COMMERCIALIZATION PROCESS

Over the past seven years, the Centers of Excellence Program has funded a consulting program to assist Center directors in preparing and implementing commercialization strategies. Each Center is unique in terms of which strategy is optimal - there is no single solution, and each requires customized approaches.

Early market surveys and competitive analyses are conducted to discover which market segments are most promising, and which product features will be of interest to potential customers and licensees. Consultants assist in targeting potential licensees for the technology and in positioning products for anticipated markets.

These early strategic discussions often reveal product variations that can be introduced to the marketplace earlier than previously planned. Such early commercialization has several benefits: (i) getting products to consumers for preliminary market validation and directional planning; (ii) early cash flow strengthens continuing research at the Center and hastens financial independence, and (iii) the future value of technology licenses is enhanced.

The Centers of Excellence Office works closely with the Technology Transfer Offices at the universities in an effort to extract maximum value from the licenses that are signed for Centers technologies. Through the commercialization consulting program, assistance is given in defining market opportunities, identifying potential target licensees, providing key information for license valuations, and consulting assistance to those companies considering license opportunities.

2003-2004 Financial Summary

University	Center	03-04 Funding	Total Funding	03-04 Matching	Patents (Pending)	Patents (Issued)	Spin-Offs
UU	Acoustic Cooling	90,000	389,000	238,439	1	0	0
USU	Advanced Imaging LADAR	135,000	135,000	259,068	0	1	0
BYU	Advanced Joining of Materials	90,000	470,000	2,100,000	11	2	1
BYU	Advanced Structural Composites	108,000	458,000	479,428	0	0	4
UU	Computational Design & Test	50,000	165,000	260,000	2	0	0
UU	Representation Multidimension	150,000	670,000	1,197,165	3	2	1
BYU	Direct Machining & Control	122,000	317,000	272,500	4	0	1
UU	Electronic Medical Education	150,000	515,000	271,000	48	7	2
UU	Global Knowledge Mgmt.	113,000	113,000	238,424	1	0	0
USU	High-Speed Information Processing	135,000	135,000	755,600	0	0	1
UU	Homogeneous DNA Analysis	150,000	150,000	307,000	1	1	0
UU	In Situ Sediment Ozonator	105,000	105,000	95,000	1	0	0
UU	Novel TiB Surface Hardening	72,000	157,000	175,000	2	1	0
UU	Petroleum Research	100,000	480,000	400,000	0	1	0
USU	Profitable Ag Byproducts	120,000	485,000	262,312	2	1	3
UU	Rapid Prototyping & Mfg	120,000	350,000	487,500	0	0	1
UU	Smart Sensors	115,000	557,000	910,002	2	0	2

2004-2005
Funded Centers

Utah Centers of Excellence Program

Description of Centers Selected for Funding 2004-2005

Center (University)

Advanced Communications Technology (BYU)
Improved wireless communications and data transmission is achieved through the use of MIMO (multiple-input multiple=output) technology with multiple antenna elements.

Advanced Imaging LADAR (USU)
Developing an airborne high-resolution, laser-based 3D color imaging platform for both military and civilian use.

Advanced Satellite Manufacturing (USU)
Leveraging the capabilities of Utah's Space Dynamics Laboratory to develop and commercialize a low cost, modular small satellite platform for commercial, science and military missions.

Alternate Strategies of Parasite Removal (U/U)
Currently refining a safe, nontoxic and rapid treatment for Pediculosis, a multibillion-dollar, increasingly resistant problem afflicting some 25% of children by the time they're teenagers.

Biomedical Microfluidics (U/U)
Technology that controls the movement of fluids in channels smaller than a human hair; micropumps that can deliver tiny quantities of drugs are just one product example.

Compliant Mechanisms (BYU)
Accelerates and streamlines commercial applications of devices that obtain their motion from the deflection of flexible parts rather than from pin joints.

Direct Machining And Control (BYU)
Developing method that allows a manufacturing machine controller to directly interpret CAD/CAM models, resulting in superior resolution for complex shapes.

Global Knowledge Management (U/U)
Developing Knowledge Fusion and Dynamic Knowledge Refreshing software to enable next-generation data mining technology.

High-Speed Information Processing (USU)
Designing fast algorithms for Application Specific Integrated Circuits, which have value in most military and compact consumer electronic devices.

Homogeneous DNA Analysis (U/U)
Developing a simple and inexpensive method for genotyping DNA samples from patients or disease organisms right in a doctor's office.

Miniature Unmanned Aerial Vehicles (BYU)
Rapid design of airframes and miniaturized autopilot and guidance systems for tiny UAVs that can be operated by novices have earned the attention of both military and civilian agencies.

Nanosize Inorganic Material Powders (U/U)
Commercializing a novel, cost-effective process (molecular decomposition) for the manufacturing of nanosize powders, the building blocks for nanotechnology applications.

Petroleum Research (U/U)
Develops cost-effective solutions for liquid hydrocarbon production, handling and transportation. Optimizes petroleum recovery; process control and production automation in oil and gas fields.

Profitable Uses of Agricultural Byproducts (USU)
Develops cost-effective technologies to treat animal wastes, generating "biogas" that can be used to produce energy, and nutrients to be used in soil amendments.

Representation of Multidimensional Information (CROMDI) (U/U)
Developed new visualization technology that facilitates the rapid and accurate analysis of large quantities of complex and continuously changing data, with applications in medicine, finance…

Smart Sensors (USU)
Engaged in the development and commercialization of sensor-based products, such as an application for the detection of faults in aircraft wiring.

Therapeutic Biomaterials (U/U)
Developing applications of biopolymers and hydrogels for clinical use in wound repair, prevention of surgical adhesions, and extending the life of donated organs.

Titanium Boride Surface Hardening (U/U)
Developing harder, longer-lived components and devices for the aerospace, biomedical and industrial markets.

Legislation

Part 6
Centers of Excellence

9-2-601. Purpose.

9-2-602. Short title - Definitions.

9-2-603. Administration - Grants.

9-2-601. Purpose.

(1) The Legislature recognizes that the growth of new industry and expansion of existing industry requires a strong technology base, new ideas, concepts, innovations, and prototypes. These generally come from strong research colleges and universities. Technical research in Utah's colleges and universities should be enhanced and expanded, particularly in those areas targeted by the state for economic development. Most states are enhancing their research base by direct funding, usually on a matching basis. The purpose of this part is to catalyze and enhance the growth of these technologies by encouraging interdisciplinary research activities in targeted areas. The Legislature recognizes that one source of funding is in matching state funds with federal funds and industrial support to provide the needed new technologies.

(2) The Legislature recommends that the governor consider the allocation of economic development funds for Centers of Excellence to be matched by industry and federal grants on at least a two-for-one basis.

(3) The Legislature recommends that such funds be allocated on a competitive basis to the various colleges and universities in the state. The funds made available should be used to support interdisciplinary research in specialized Centers of Excellence in technologies that are considered to have potential for economic development in this state.

History: C. 1953, 63-62-1, enacted by L. 1985, ch. 103, § 1; 1986, ch. 109, § 1; renumbered by L. 1992, ch. 241, § 60.

9-2-602. Short title - Definitions.

(1) This part is known as the "Centers of Excellence Act."

(2) As used in this part, "Centers of Excellence" means university-based, industry-supported, cooperative research and development programs.

History: C. 1953, 63-62-2, enacted by L. 1985, ch. 103, § 2; 1986, ch. 109, § 2; renumbered by L. 1992, ch. 241, § 61.

9-2-603. Administration - Grants.

(1) This part shall be administered by the Division of Business and Economic Development.

(2) The department may award grants to the various colleges and universities in the state for the purposes of this part.

(3) Recommendations for funding shall be made by the division with the advice of the State Advisory Council for Science and Technology, with the approval of the board. Each proposal shall receive the best available outside review.

(4) In considering each proposal, the division shall weigh technical merit, the level of matching funds from private and federal sources, and the potential for job creation and economic development. Proposals or consortia that combine and coordinate related research at two or more colleges and universities shall be encouraged.

(5) The State Advisory Council on Science and Technology shall review the activities and progress of individual centers on a regular basis and assist the division in preparing an annual report on the accomplishments and direction of the Centers of Excellence Program.

History: C. 1953, 63-62-3, enacted by L. 1986, ch. 109, § 3; renumbered by L. 1992, ch. 241, § 62.

Repeals and Reenactments. - Laws 1986, ch. 109, § 3 repealed former § 63-62-3, as enacted by L. 1953, ch. 103, § 3, relating to creation of a committee for technology excellence in engineering research, and enacted the above section.